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Issued April 30, 1912.

U. S. DEPARTMENT OF AGRICULTURE.

FOREST SERVICE—BULLETIN 106.

HENRY S. GRAVES, Forester.

WOOD-USING INDUSTRIES AND NATIONAL FORESTS OF ARKANSAS.

PART I.—USES AND SUPPLY OF WOOD IN ARKANSAS.

BY

J. T. HARRIS, STATISTICIAN, AND HU MAXWELL, EXPERT.

PART II.—TIMBER RESOURCES OF THE NATIONAL FORESTS IN ARKANSAS.

BY

FRANCIS KIEFER, FOREST SUPERVISOR.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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LETTER OF TRANSMITTAL.

United States Department of Agriculture,
Forest Service,
Washington, D. C., January 30, 1912.

Sir: I have the honor to transmit herewith a manuscript entitled "Wood-Using Industries and National Forests of Arkansas;" Part I, Uses and Supply of Wood in Arkansas, by J. T. Harris, statistician, and Hu Maxwell, expert; Part II, Timber Resources of the National Forests in Arkansas, by Francis Kiefer, forest supervisor, and to recommend its publication as Bulletin 106 of the Forest Service.

Respectfully, Henry S. Graves,
Forester.

Hon. James Wilson,
Secretary of Agriculture.

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WOOD-USING INDUSTRIES OF ARKANSAS.

SCOPE OF THE STUDY.

Arkansas contains about 34,000,000 acres of land and half a million acres of water. Four-fifths of the land is covered with forests or woods of some sort, and one-fifth is in farms. The woodlands grade from tracts heavily timbered with valuable species down to those containing little more than brush. Lumbering began in the State on a small scale a century ago, and cutting has gone on ever since. Systematic lumbering in Arkansas, however, is comparatively recent, and the State is to-day one of the richest in timber resources. About 100 kinds of trees grow there, but some of them are not now put to use, because they are too small or too scarce. About 60 kinds are cut and sold, but not more than half are commonly distinguished as separate species in the regions where they are cut.

The principal growth of shortleaf pine is in the southwestern part of the State; loblolly is found in the valleys of the Ouachita and Little Missouri Rivers; cypress along the White, Red, Ouachita, Saline, and Arkansas Rivers; longleaf pine near the Louisiana and Texas borders; while the hardwoods grow in all parts of the State, but in largest quantity in the northern portions.

The total annual drain upon the forests of Arkansas is not much, if any, short of 5,000,000,000 board feet. Latest returns credit the State with a lumber output of 2,111,300,000 feet; cooperage, lath, veneer, shingles, etc., 114,312,000 feet; firewood, 2,581,674,000 feet;[1] and crossties, poles, cross arms, and wood distillation unknown. The enormous quantity of forest material annually supplied by Arkansas is not exceeded by that of more than two or three other States.

This bulletin (Part I) deals only with that part of the forest output of the State which belongs to products further manufactured. Rough lumber which is used in that condition, or is sent in that form beyond the State, does not fall within the scope of this study; nor do crossties, poles, posts, cooperage, wood distillation, pulp, shingles, and veneers. Some of them might properly be classed as manufactured products, but they are regularly covered by reports issued by the

[1] Forest Service Circular 181 gives the output of firewood at 4,302,790 cords. It is estimated that a cord is equivalent to about 600 feet of lumber.

Bureau of the Census in cooperation with the Forest Service; and to list and consider them again would be useless duplication. Part I of this bulletin, then, shows what part of the sawmill output passes through further processes of manufacture in the State,[1] and gives the average prices paid at the factories for different species by every industry; data showing what woods and what proportion of each grow in the State or are brought in from outside; the properties which qualify them for others; the efforts which have been successfully made to reduce loss through waste; and finally the subject of markets, though no effort has been made to present an exhaustive treatment of the last. The statistics which form the basis of this part were collected first-hand from manufacturers throughout the State, and may therefore be depended upon to be as nearly correct as circumstances would allow.

Part II deals with the timber on the National Forests in Arkansas and the means of purchasing it.

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[1] It is not possible fully to list or specify the grades and dimensions of lumber used by manufacturers in any important industry, because practices differ. A box factory, for instance, might buy logs and do its own sawing into all sizes needed; or it might purchase ordinary lumber, and resaw it; or it might want nothing but thin lumber or veneer. The same is true of furniture factories. Almost every form, size, and grade are good for some kind or some part of furniture; but every furniture factory does not make every kind of furniture, and material which one manufacturer might buy, another could not use. Moreover, the same factory does not buy similar sizes and grades at all times.

Some industries, however, are in the market for well-established sizes and grades of stock. A good deal of the wood for chairs is cut in regular sizes; buggy spokes, and poles, and shafts go to market in the same way; and not infrequently other particular commodities are made from standard sizes of rough material. But when such is the case it is simply the exception to the rule that almost every factory buys its unfinished material on individual specifications.

It is as nearly impossible to state what grades are demanded by industries as to designate the sizes. Practically every grade has some place to fill, but not infrequently a specific purpose demands a certain grade and will take no other.

A partial list of grades and sizes demanded by certain industries is given in the Appendix.

PART I.—USES AND SUPPLY OF WOOD IN ARKANSAS.

KINDS AND QUALITIES OF WOODS USED.

More than 91 per cent of the wood manufactured into finished commodities in Arkansas is grown in the State. Practically none would come in from the outside except for the fact that forested regions lie near the borders and seek their most convenient markets across the line. The State produces more than enough wood to supply all its industries; and, except four or five species, it grows all the kinds it needs.

Table 1 lists 27 woods used in the State. Some are really two or more species grouped as one. Fifteen oaks grow in Arkansas, but the manufacturers reported only two, white and red. The State has half a dozen species of hickory, all of commercial importance, but all are grouped as one; three kinds of maple are cut, but are sold as one; three or four of ash, but only one is recognized in the market; but not one manufacturer reported loblolly pine, though a comparatively large amount is cut in Arkansas. It is evidently marketed as shortleaf.

TABLE 1.—*Amount of wood consumed annually in Arkansas by species, together with the cost and per cent grown in and out of the State.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Shortleaf pine	972,451,000	71.43	$10.00	$9,723,800	96.15	3.85
Red gum	100,186,000	7.36	11.46	1,147,841	96.74	3.26
Longleaf pine	69,138,060	5.08	11.97	827,730	24.97	75.03
White oak	66,092,000	4.85	17.70	1,169,918	94.50	5.50
Hickory	46,096,000	3.39	19.10	880,848	93.14	6.86
Red oak	39,301,000	2.89	12.73	500,220	89.29	10.71
Ash	24,183,000	1.78	32.78	792,623	68.59	31.41
Cottonwood	16,748,000	1.23	12.51	209,575	93.28	6.72
Cypress	12,315,000	.90	14.78	182,048	97.69	2.31
Elm	6,645,000	.49	12.14	80,652	76.46	23.54
Tupelo	5,377,000	.39	8.91	47,911	97.12	2.88
Sycamore	1,602,000	.12	11.04	17,680	100.00	.....
Persimmon	250,000	.02	33.00	8,250	100.00	.....
White pine	210,000	.02	40.48	8,500	.....	100.00
Hackberry	150,000	.01	10.00	1,500	100.00	.....
Osage orange	150,000	.01	123.30	18,500	.....	100.00
Maple	144,000	.01	24.05	3,463	79.17	20.83
Birch	82,000	.01	57.62	4,725	20.73	79.27
Yellow poplar	60,000	.01	70.00	4,200	50.00	50.00
Walnut	55,000	(1)	49.73	2,735	100.00	.....
Locust	52,000	(1)	10.19	530	100.00	.....
Mahogany	26,000	(1)	140.19	3,645	.....	100.00
Basswood	25,000	(1)	21.00	525	60.00	40.00
Beech	17,000	(1)	20.00	340	58.82	41.18
Cedar	12,000	(1)	46.67	560	.....	100.00
Cherry	10,000	(1)	40.00	400	100.00	.....
Sugar pine	5,000	(1)	90.00	450	.....	100.00
Total	1,361,382,000	100.00	11.49	15,639,169	91.57	8.43

[1] Less than 0.01 per cent.

Nearly every wood possesses some quality which fits it for certain purposes. It may be color, grain, weight, strength, elasticity, facility in taking stain, lasting properties, freedom from taste or odor, or perhaps cheapness. The woods listed in Table 1 will be briefly described.

Shortleaf pine.—Nearly three-fourths of all the wood employed for manufacturing purposes in Arkansas is shortleaf pine. It is probable that some loblolly pine is listed with it. Shortleaf pine in Arkansas is generally considered of a higher grade than the same species grown in other regions. It is soft, of good color, and the wide annual rings show well in the grain. It is a favorite material for sash, doors, and ceilings; and is well liked for flooring, though its softness places it at a little disadvantage for the last use as compared with longleaf pine. Shortleaf grows faster than longleaf, particularly during the first 30 or 40 years; and the sapwood is thick. Sometimes sawlogs have very little heartwood. In this respect it resembles loblolly.

Longleaf pine.—Longleaf pine is not abundant in Arkansas, and three-fourths of that reported was brought in from Louisiana, Mississippi, and Texas. It is a slow-growing tree, and the wood is very strong, stiff, and durable, making it suitable for trusses, frames, and beams where strength is wanted. It is one of the best floor woods in the country. Its narrow rings and thin sapwood serve in almost all cases to distinguish it from shortleaf, loblolly, and Cuban pine, which have thick sapwood and wide rings. Further south these four species frequently grow in the same localities, but seldom or never associate in Arkansas, where loblolly and longleaf are rather scarce, and the Cuban pine is not found.

Red gum.—Arkansas produces more red gum lumber than any other State, and one-half of the mill output is further manufactured at home. The rise of this wood from obscurity to prominence has been phenomenal. Once considered practically worthless, it now stands high among furniture and finish woods, for musical instruments, and for many other purposes. It may be successfully finished to imitate Circassian walnut, oak, mahogany, and other expensive cabinet woods. Its own grain finished naturally from carefully selected logs is scarcely surpassed by any wood of this country. In Europe it is known as satin walnut.

White oak.—Several species belonging to the white oak group are reported in Arkansas simply as white oak. Among these are the true white oak (*Quercus alba*), post oak (*Quercus minor*), bur oak (*Quercus macrocarpa*), overcup oak (*Quercus lyrata*), swamp white oak (*Quercus platanoides*), and cow or basket oak (*Quercus michauxii*). There is not much difference in the woods, and they are seldom sold separately in this region.

Red oak.—A number of Arkansas oaks are grouped as red oak in the lumber yard and factory. The true red oak (*Quercus rubra*) is

not plentiful in Arkansas. The most common tree of the red oak group in the State is the Texan or spotted oak (*Quercus texana*). Willow oak (*Quercus phellos*), yellow or black oak (*Quercus velutina*), water oak (*Quercus nigra*), and Spanish oak (*Quercus digitata*) are cut in large or small amounts and listed as red oak. In some industries, such as machinery and vehicle, the white and red oaks are valued chiefly for their strength, while in others, like the furniture and interior finish, the figure and grain of the wood are most important. Some of the oaks possess much handsomer grain than others, and sell for more. The grain is best brought out by quarter sawing, which exposes the flat sides of the medullary rays, the bright clear streaks or flakes so prominent in the oaks.

Hickory.—Without counting pecan, there are five species of hickory cut and manufactured in Arkansas, but all go under one name. The kinds are known separately as mocker nut (*Hicoria alba*), pale-leaf hickory (*Hicoria villosa*), shagbark (*Hicoria ovata*), bitternut (*Hicoria minima*), and pignut (*Hicoria glabra*). All of these bear a general resemblance. The wood is strong, tough, and elastic, and these properties fit it for special purposes, chiefly for vehicles and handles. It is perhaps the most nearly indispensable wood growing in this country, and none is known anywhere that will satisfactorily take its place for slender handles and certain parts of light vehicles. In Arkansas it stands fifth in quantity and fourth in value.

Ash.—The single name, ash, covers in Arkansas, white, green, black, and blue ash. These are sometimes distinguished in the woods, but at the mills it is not customary to pile them apart or sell them separately. There is some difference in the weight, strength, and color of the wood of the four species, but not enough to call for separate use.

Cottonwood.—The common cottonwood and the swamp cottonwood are both cut in Arkansas, but manufacturers make no distinction between them.

Cypress.—Manufacturers in the State demand 12,000,000 feet of cypress a year, but the sawmills are cutting four times that much. The timber grows very slowly, and it is evident that the demand will shortly exhaust the supply.

Elm.—Two elms are listed as one in this State, the common or white elm and the wing elm. It is not apparent that one is preferred to the other. Both are tough and strong, and are used because of those properties, and not for any beauty of figure or grain. The wing elm is so named because a thin, corky ridge or wing grows along opposite sides of the small twigs, giving them a wide, flat appearance.

Tupelo.—Tupelo has always been used in a small way for a few purposes, but, like red gum, it was not appreciated until a few years

ago, when the discovery was made that it is a good substitute for yellow poplar for a number of purposes. It is usually marketed under the name "bay poplar." Some call it black gum, though the true black gum (*Nyssa sylvatica*) is a different tree, but grows in Arkansas. The tupelo is a swamp tree, and is often, but not always, found associated with cypress.

Sycamore.—About one-fourth of the rough sycamore lumber cut in Arkansas is further manufactured within the State. There is only one species of sycamore in the United States east of the Rocky Mountains, and the wood is not apt to be mistaken for any other in the lumber yard or in the finished product.

Persimmon.—About one-fifth of the persimmon lumber cut in the United States is reported by Arkansas manufacturers. This wood is like hickory in one respect—the sapwood is considered most valuable. Much persimmon is made into shuttles, only the sapwood being used. The heartwood is of dark color, and is occasionally made into parquet flooring or inlay work. Persimmon belongs to the ebony family of trees.

White pine.—True white pine (*Pinus strobus*) does not grow in Arkansas, and what is used there is imported from the North or Northeast, or some kindred pine is brought from the far West or Northwest. Sometimes in Arkansas, however, a very soft and white variety of shortleaf pine is called white pine, and occasionally it may be sold as such.

Hackberry.—This wood does not appear to be singled out for any special use in Arkansas. It resembles ash and often goes to market with it.

Osage orange.—Osage orange is a fence-post and vehicle wood, very heavy, hard, strong, and enduring. It is one of the most costly in the United States, and the highest in price reported by Arkansas manufacturers, except mahogany. It does not grow in commercial quantities in the State, but comes from Oklahoma and Texas.

Maple.—A little hard or sugar maple is found in Arkansas, but it is of minor importance. Some red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), and box elder (*Acer negundo*) are cut, and they all seem to be put to use without distinction. The total quantity is not large. Some sugar maple is brought in from the North.

Birch.—Two species of birch are used for manufacturing pusposes in the State. Sweet birch (*Betula lenta*) is imported from the North or Northeast, but river birch (*Betula nigra*) is native. The former is a furniture wood, but the latter is used for common purposes only.

Yellow poplar.—Only a small amount of yellow poplar was reported by manufacturers in the State, and most of that came from the outside.

Black walnut.—The cut of black walnut in Arkansas is small, and that which was further manufactured was all home-grown. It is not the important furniture wood that it once was, though most of what is used in the State is made into furniture.

Locust.—Locust, that is, the black or yellow locust (*Robinia pseudacacia*), reaches its southwestern limit in or near Arkansas, though planted specimens may be found outside the tree's natural range. It does not attain to much importance there, though it is one of the strongest, stiffest, and most enduring of American woods. Honey locust is a less valuable tree, but more abundant in the South.

Mahogany.—This well-known cabinet wood does not grow in commercial quantity in the United States at this time. Several woods are sometimes grouped as mahogany, the two principal species coming, the one from tropical America, the other from tropical Africa.

Basswood.—Little basswood grows in Arkansas, and little is used there. It is a northern tree, and more lumber is cut in Wisconsin and Michigan than in any other States.

Beech.—Beech is a negligible quantity in Arkansas, but serves some purposes very well. It is one of the best woods for veneers, platters, and berry boxes, and it fills some important places in furniture making.

Red cedar.—This is the common cedar found in all Southern States, and is now the best lead-pencil wood obtainable. It was once abundant, but the demand for poles, posts, woodenware, and pencils has nearly exhausted the supply.

Cherry.—This valuable furniture wood is too scarce in Arkansas to be of much importance. The quality is good, however. The country's commercial supply is found in Pennsylvania and other Northern States.

Sugar pine.—Sugar pine is a California tree which is occasionally substituted for white pine. A very limited amount finds its way into Arkansas factories.

CONSUMPTION OF WOOD BY INDUSTRIES.

Table 2 shows how the nearly 1,400,000,000 feet of wood which yearly passes through Arkansas factories is apportioned among the 15 industries represented in the State. The largest industry accounts for more than a billion feet, and the smallest demands little more than a quarter of a million. A number of very small industries, however, are grouped in the table as one under "Miscellaneous." On succeeding pages are given in detail the statistics for each industry.

TABLE 2.—*Annual consumption of wood by industries, cost of raw material, and per cent grown in and out of Arkansas.*

Industry.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Planing-mill products	1,050,739,000	77.18	$10.12	$10,631,541	91.71	8.29
Boxes and crates	105,552,000	7.75	10.80	1,139,760	95.93	4.07
Vehicle stock	76,491,000	5.62	19.74	1,509,720	91.85	8.15
Handles	38,938,000	2.86	23.87	929,483	79.10	20.90
Sash, doors, blinds, and general millwork	19,956,000	1.46	13.96	278,561	98.77	1.23
Miscellaneous	17,140,000	1.26	9.70	166,275	79.26	20.74
Furniture	15,373,000	1.13	24.90	382,735	85.44	14.56
Car construction	12,350,000	.91	11.79	145,550	88.26	11.74
Chairs	7,542,000	.55	15.72	118,542	97.71	2.29
Baskets	5,270,000	.39	10.46	55,135	92.88	7.12
Farm implements	3,924,000	.29	19.82	77,770	83.44	16.56
Vehicles	3,546,000	.26	36.34	128,878	96.84	3.16
Caskets and coffins	3,067,000	.23	16.53	50,684	92.60	7.40
Boats	1,210,000	.09	17.40	21,060	100.00	.....
Trunks	284,000	.02	15.76	4,475	96.48	3.52
Total	1,361,382,000	100.00	11.49	15,639,169	91.57	8.43

PLANING-MILL PRODUCTS.

Three-fourths of all the lumber demanded by the wood-using industries of Arkansas is represented in Table 3 as planing-mill products. This is a somewhat general term intended to cover all planing-mill output which is not made for some particular purpose. Many sawmills, and especially the large ones, plane much lumber, chiefly to reduce its weight and lessen freight charges. Much of the material in Table 3 is lumber that has been planed but has not been further manufactured. Much of it also is heavy timber, suitable for bridges, trestles, and framework, or boards which might be used for sheathing, subfloors, fencing, or many other purposes. The major portion of the material listed, however, consists of lumber that is practically finished and ready for the use to which it is finally put, and includes such items as flooring, ceiling, siding, partition, wainscoting, etc. The dividing line between products represented in this table and those in Table 7 (millwork) is not always clear, but is generally based on whether the material upon leaving the planing mill is in final form for use, such as flooring, or whether it is to undergo further manufacture. The lumber shown in Table 3 is generally surfaced, including tongued and grooved material; that in Table 7 is milled still further and is made into sash, doors, blinds, molding, or some particular commodity.

TABLE 3.—*Annual consumption of wood for planing-mill products.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Shortleaf pine	915,613,000	87.14	$9.84	$9,010,047	95.97	4.03
Longleaf pine	66,333,000	6.31	11.94	791,920	24.62	75.38
Red gum	29,719,000	2.83	11.08	329,175	100.00	.....
White oak	18,160,000	1.73	12.07	219,159	100.00	.....
Red oak	10,624,000	1.01	11.77	125,105	100.00	.....
Cypress	7,712,000	.73	14.11	108,809	100.00	.....
Hickory	1,350,000	.13	15.07	20,350	100.00	.....
Ash	1,000,000	.10	15.00	15,000	100.00	.....
White pine	200,000	.02	40.00	8,000	.....	100.00
Birch	15,000	.....	53.00	795	100.00	.....
Mahogany	11,000	.....	195.00	2,145	.....	100.00
Tupelo	2,000	.....	18.00	36	100.00	.....
Total	1,050,739,000	100.00	10.12	10,630,541	91.71	8.29

Eighty-seven per cent of the wood shown in Table 3 is shortleaf pine. This species furnishes most of the lumber in Arkansas, and the large mills which plane their output to reduce freight saw shortleaf pine far in excess of all other species. Most of the longleaf pine comes from outside the State, and is cut by mills near the Louisiana border.

The low average cost of the lumber in Table 3 is based to a large extent on the cost of stumpage, logging, and sawing; the first of which is evidently figured very low, especially in the case of shortleaf pine, the cost of which is generally estimated in the log f. o. b. mill.

BOXES AND CRATES.

Boxes and crates as understood in this report include containers and shipping cases of nearly every kind, if made wholly or partly of wood, but baskets are considered separately in Table 11. Box factories buy their raw material in many forms. Some purchase logs and saw them into dimensions desired, others cut them into veneer by the rotary process. Lumber is frequently resawed, or low-grade material culled over. Few box mills turn out nailed boxes, but make shooks and sell them in the knocked-down condition. A form of box much used has veneer for sides, reenforced corners, and thick lumber for ends. Shipping cases of that design are light and often as strong as all-lumber boxes. Three-ply veneer, the grain of the middle sheet crossing that of the outside sheets at right angles, is widely used for large as well as small boxes. Red gum, as Table 4 shows, is the wood most used in Arkansas for boxes, with shortleaf pine next. Cottonwood, cypress, sycamore, and ash are often selected for boxes in which provisions are shipped, because these woods are remarkably free from stain and odor. Elm and oak are preferred for crates which must resist strains and shocks.

TABLE 4.—*Annual consumption of wood for boxes and crates.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Red gum	47,363,000	44.87	$9.92	$469,800	98.84	1.16
Shortleaf pine	27,035,000	25.61	12.10	327,200	100.00	.....
Red oak	17,500,000	16.58	10.43	182,600	78.86	21.14
Cottonwood	7,901,000	7.49	11.63	91,880	100.00	.....
Cypress	2,910,000	2.76	12.22	35,550	98.97	1.03
Elm	1,293,000	1.22	10.06	13,010	100.00	.....
Sycamore	1,000,000	.95	10.00	10,000	100.00	.....
Ash	520,000	.49	18.00	9,360	100.00	.....
Longleaf pine	30,000	.03	12.00	360	50.00	50.00
Total	105,552,000	100.00	10.80	1,139,760	95.93	4.07

VEHICLE STOCK.

The manufacture of vehicle stock is one of the most important industries in Arkansas. The factory which turns out vehicle stock may be quite separate from the factory which makes vehicles. The manufacturer of stock does not, as a general thing, make finished vehicles, but parts only, such as spokes, rims, hubs, axles, and poles or shafts. He ships these to other factories which turn out complete vehicles by assembling the parts and ironing and painting them. Table 5 presents statistics of the manufacture of vehicle stock, and Table 13 the manufacture of vehicles. In Arkansas the former class uses 76,000,000 feet of wood, the latter 3,500,000. It might seem that the same material is listed twice, first when it leaves the vehicle-stock factory, and again when another establishment assembles the parts. Nearly all the vehicle parts considered in Table 5, however, were shipped to northern factories to be put together, and thus do not appear in Table 13. Enough vehicle parts are reported in the State to make twenty times as many finished vehicles as are produced in Arkansas. Some part of the 3,500,000 feet of wood used for finished vehicles may be material listed in Table 5, but every effort has been made to prevent duplication. Arkansas is rich in vehicle woods, and contributes material to most of the large vehicle manufacturers throughout the country, particularly those of Chicago, Cincinnati, St. Louis, and Memphis.

TABLE 5.—*Annual consumption of wood for vehicle stock.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
White oak	34,038,000	44.50	$17.78	$605,142	90.65	9.35
Hickory	22,263,000	29.11	24.11	536,766	91.86	8.14
Red gum	6,000,000	7.85	13.47	80,800	100.00	.....
Cottonwood	3,667,000	4.79	14.36	52,670	90.46	9.54
Red oak	3,379,000	4.42	27.72	93,672	91.57	8.43
Shortleaf pine	3,100,000	4.05	12.26	38,000	100.00	.....
Ash	2,569,000	3.36	29.82	76,595	76.84	23.16
Elm	1,225,000	1.60	17.55	21,500	100.00	.....
Cypress	225,000	.29	18.00	4,050	100.00	.....
Basswood	25,000	.03	21.00	525	60.00	40.00
Total	76,491,000	100.00	19.74	1,509,720	91.85	8.15

HANDLES.

Hickory and ash are the leading handle woods of Arkansas. Hickory is made into handles which must be tough and elastic, as for axes and hammers. Most of the ash shown in Table 6 is used for hoe handles. The handles of saws, augers, mallets, squares, planes, and similar tools, may be of maple, beech, red gum, oak, or elm. Handles for packages, boxes, buckets, and baskets account for the use of cypress, sycamore, and some of the other woods listed in the table.

TABLE 6.—*Annual consumption of wood for handles.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Hickory	21,798,000	55.98	$13.75	$299,662	93.81	6.19
Ash	14,700,000	37.75	40.88	601,000	54.08	45.92
Red gum	800,000	2.05	8.00	6,400	100.00	.....
Elm	760,000	1.95	11.05	8,400	100.00	.....
White oak	400,000	1.03	15.00	6,000	100.00	.....
Maple	143,000	.37	24.06	3,441	79.02	20.98
Red oak	120,000	.31	12.00	1,440	100.00	.....
Sycamore	100,000	.26	14.00	1,400	100.00	.....
Cypress	100,000	.26	14.00	1,400	100.00	.....
Beech	17,000	.04	20.00	340	58.82	41.18
Total	38,938,000	100.00	23.87	929,483	79.10	20.90

GENERAL MILLWORK.

Besides sash, doors, and blinds, Table 7 includes wood used for screens, moldings, stairwork, and similar products. In most instances the lumber is passed through planing mills or wood-working machines to fit it for particular purposes, and is thus distinguished from the material listed in Table 3 as "planing-mill products." Shortleaf pine makes up more than nine-tenths of the total. Sugar pine from California, 5,000 feet of which was used in this industry,

is the only Pacific coast wood reported in Arkansas. The only yellow poplar reported for the State is also listed here.

TABLE 7.—*Annual consumption of wood for sash, doors, blinds, and general millwork.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Shortleaf pine	18,353,000	91.97	$13.56	$248,876	100.00	.....
Red gum	808,000	4.05	7.00	5,656	100.00	.....
Cypress	460,000	2.31	27.35	12,579	82.61	17.39
Longleaf pine	200,000	1.00	12.00	2,400	70.00	30.00
Birch	65,000	.33	60.00	3,900	.....	100.00
Yellow poplar	60,000	.30	70.00	4,200	50.00	50.00
Sugar pine	5,000	.02	90.00	450	.....	100.00
Mahogany	5,000	.02	100.00	500	.....	100.00
Total	19,956,000	100.00	13.96	278,561	98.77	1.23

FURNITURE.

Red gum and white oak together constitute 95 per cent of the woods used in furniture making in Arkansas (Table 8), though more kinds of woods are employed in this industry than in any other. White oak is generally an outside wood and is finished to give the best appearance. Red gum may be for both outside and inside. It takes an excellent finish, and the prediction has been made that in time it will be as valuable as white oak. If rotary-cut veneer of red gum is carefully selected to show grain and figure, it can be made to resemble Circassian walnut so closely that few can tell one from the other. It may be stained also to imitate white oak, cherry, and mahogany. The small showing made by shortleaf pine is remarkable in view of the large amounts demanded by some other industries.

TABLE 8.—*Annual consumption of wood for furniture.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Red gum	9,061,000	58.94	$20.29	$183,880	82.40	17.60
White oak	5,586,000	36.34	32.45	181,240	92.16	7.84
Red oak	346,000	2.25	22.88	7,918	56.65	43.35
Cottonwood	100,000	.65	13.00	1,300	75.00	25.00
Shortleaf pine	66,000	.43	20.98	1,385	100.00	.....
Elm	60,000	.39	11.00	660	100.00	.....
Ash	52,000	.34	19.81	1,030	100.00	.....
Walnut	52,000	.34	50.00	2,600	100.00	.....
Cedar	10,000	.06	50.00	500	.....	100.00
Cherry	10,000	.06	40.00	400	100.00	.....
Mahogany	10,000	.07	100.00	1,000	.....	100.00
White pine	10,000	.07	50.00	500	.....	100.00
Cypress	3,000	.02	70.00	210	100.00	.....
Birch	2,000	.01	15.00	30	100.00	.....
Locust	2,000	.01	15.00	30	100.00	.....
Sycamore	2,000	.01	15.00	30	100.00	.....
Maple	1,000	.01	22.00	22	100.00	.....
Total	15,373,000	100.00	24.90	382,735	85.44	14.56

CAR CONSTRUCTION.

The four woods listed as car-manufacturing material are shown in Table 9. Most of it is used in repairing freight cars at the division headquarters of the various railroads.

TABLE 9.—*Annual consumption of wood for car construction.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Shortleaf pine	4,500,000	36.44	$10.50	$47,250	90.00	10.00
Red oak	4,128,000	33.42	11.00	45,408	100.00	.....
White oak	2,222,000	17.99	16.04	35,642	100.00	.....
Longleaf pine	1,500,000	12.15	11.50	17,250	33.33	66.67
Total	12,350,000	100.00	11.79	145,550	88.26	11.74

CHAIRS.

Though chairs and furniture belong in the same general class, the two kinds of commodities are frequently made in separate factories and are reported separately. Many small mills cut chair stock exclusively, and sell it to factories which make nothing but chairs. In the few instances where factories which have made both did not separate them the whole output has been listed as furniture. The amount and kind of wood used in Arkansas for chairs are shown in Table 10.

TABLE 10.—*Annual consumption of wood for chairs.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
White oak	2,810,000	37.26	$17.81	$50,040	99.57	0.43
Red oak	2,677,000	35.49	14.10	37,747	97.24	2.76
Elm	950,000	12.60	17.50	16,625	98.74	1.26
Red gum	855,000	11.34	12.84	10,980	97.66	2.34
Tupelo	175,000	2.32	12.00	2,100	68.57	31.43
Hickory	75,000	.99	14.00	1,050	100.00	.....
Total	7,542,000	100.00	15 72	118,542	97.71	2.29

BASKETS.

The woods employed by the basket manufacturers in Arkansas are listed in Table 11. The line between baskets and boxes is not always clearly drawn, but generally the shape settles it. The use to which the container is put does not always determine whether it is a basket, box, bowl, or crate. The baskets considered in Table 11 are chiefly for berries, small fruits, and vegetables. They are made

partly or wholly of wood, most of them consisting of a thick bottom to give strength, and thin veneer sides to insure lightness. They range in size from a pint to nearly a bushel, and are sold with their contents.

TABLE 11.—*Annual consumption of wood for baskets.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Tupelo	3,100,000	58.82	$9.28	$28,775	96.77	3.23
Red gum	1,175,000	22.30	11.81	13,875	95.74	4.26
Cottonwood	560,000	10.63	13.00	7,280	82.14	17.86
Elm	235,000	4.46	12.79	3,005	68.09	31.91
Shortleaf pine	200,000	3.79	11.00	2,200	75.00	25.00
Total	5,270,000	100.00	10.46	55,135	92.88	7.12

AGRICULTURAL IMPLEMENTS.

Arkansas has an abundance of wood suitable for the manufacture of agricultural implements, but is putting only a moderate amount of it to use. Seven species are reported in Table 12, and the total quantity falls a little short of 4,000,000 feet, over half of which is ash. The exclusion of tool handles and farm wagons (both of which are shown in other tables) accounts for the rather small showing for agricultural implements. Factories in Northern States making commodities of this kind draw very much larger quantities of wood from Arkansas than the factories at home.

TABLE 12.—*Annual consumption of wood for agricultural implements.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Ash	2,250,000	57.34	$22.22	$50,000	88.89	11.11
White oak	546,000	13.92	17.76	9,695	100.00	.....
Red oak	502,000	12.79	12.10	6,075	100.00	.....
Longleaf pine	500,000	12.74	20.00	10,000	20.00	80.00
Red gum	50,000	1.27	14.00	700	100.00	.....
Hickory	46,000	1.17	20.43	940	100.00	.....
Shortleaf pine	30,000	.77	12.00	360	100.00	.....
Total	3,924,000	100.00	19.82	77,770	83.44	16.56

VEHICLES.

Table 13 gives the woods used in the manufacture of vehicles in Arkansas. Farm and road wagons are almost the only kind made. The material which goes into buggies, carriages, spring wagons, carts, and others of that class is listed as "vehicle stock" in Table 5.

Osage orange is a rather important wood in the wagon industry and costs more than twice as much per 1,000 feet as any other. This is due to its hardness, lasting properties, and more than all else, to its small tendency to shrink and swell in the changes of weather. The comparatively large amount of cottonwood used by vehicle makers is for wagon beds. Yellow poplar was formerly the best available wood for that purpose, but its price is now too high. Next after Osage orange, hickory is the highest-priced vehicle wood in the State.

TABLE 13.—*Annual consumption of wood for vehicles.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
White oak	1,500,000	42.30	$35.00	$52,500	100.00	.....
Cottonwood	800,000	22.56	37.00	29,600	100.00	.....
Shortleaf pine	500,000	14.10	20.00	10,000	100.00	.....
Hickory	400,000	11.28	47.00	18,800	100.00	.....
Red gum	200,000	5.64	23.00	4,600	100.00	.....
Osage orange	100,000	2.82	125.00	12,500	.....	100.00
Elm	25,000	.71	20.00	500	52.00	48.00
Ash	21,000	.59	18.00	378	100.00	.....
Total	3,546,000	100.00	36.34	128,878	96.84	3.16

COFFINS AND CASKETS.

Six woods serve as material for coffins and caskets in Arkansas, and the quantity and price of each is shown in Table 14. No foreign wood appears, which is unusual, since in most States mahogany is an important casket material. The average cost of the woods in this industry is very low, due partly to the large quantity of shortleaf pine used. Much cypress is also used. It is very enduring and has been employed for coffins in the South for more than 200 years. It is said that the hewed coffin in which De Soto was buried 350 years ago in the waters of the Mississippi, near the mouth of the Arkansas River, was of cypress.

TABLE 14.—*Annual consumption of wood for caskets and coffins.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Shortleaf pine	2,107,000	68.70	$14.11	$29,724	100.00	.....
Cypress	820,000	26.74	22.18	18,190	78.66	21.34
Red gum	105,000	3.42	15.95	1,675	52.38	47.62
White oak	30,000	.98	30.00	900	100.00	.....
Walnut	3,000	.10	45.00	135	100.00	.....
Cedar	2,000	.06	30.00	60	.....	100.00
Total	3,067,000	100.00	16.53	50,684	92.60	7.40

BOATS.

The boat industry in Arkansas consists largely in the manufacture of a single commodity—oars. Practically all of the ash, which meets 87 per cent of the whole demand, is made into these, and finds its way to all the principal markets of the country. Every foot of the wood is supplied by the State. Much of the best comes from the White River and the northern streams.

TABLE 15.—*Annual consumption of wood for boats.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Ash	1,050,000	86.78	$18.00	$18,900	100.00	.....
Shortleaf pine	100,000	8.26	12.00	1,200	100.00	.....
Cypress	60,000	4.96	16.00	960	100.00	.....
Total	1,210,000	100.00	17.40	21,060	100.00	.....

TRUNKS.

More than a quarter of a million feet of lumber is used annually in the manufacture of trunks in Arkansas. Nearly all the wood listed in Table 16 is home grown. The exception is elm used as three-ply veneer, 25 per cent of which comes from without the State.

TABLE 16.—*Annual consumption of wood for trunks.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Shortleaf pine	186,000	65.49	$15.32	$2,850	100.00	.....
Elm	40,000	14.09	12.00	480	75.00	25.00
Cottonwood	38,000	13.38	20.66	785	100.00	.....
Ash	20,000	7.04	18.00	360	100.00	.....
Total	284,000	100.00	15.76	4,475	96.48	3.52

MISCELLANEOUS.

Table 17 gives the woods used for miscellaneous products, such as wheelbarrows, spools, shuttles, bobbins, lasts, beehives, pails, toys, golf heads, and excelsior, no one of which is manufactured in sufficient quantity to entitle it to the rank of an industry. Excelsior constitutes a large part of the total, and the cheapness of the wood which reaches the excelsior mills is responsible for the low average cost of all. Shortleaf pine and cottonwood are most important woods in the manufacture of excelsior. All of the persimmon reported by manufac-

tures in the State is found in Table 17. Most of it is converted into shoe lasts and golf heads.

TABLE 17.—*Annual consumption of wood for miscellaneous products.*

Kind of wood.	Quantity.		Average cost per 1,000 feet f. o. b. factory.	Total cost f. o. b. factory.	Grown in Arkansas.	Grown out of Arkansas.
	Feet b. m.	Per cent of total.				
					Per cent.	*Per cent.*
Red gum	4,050,000	23.63	$9.95	$40,300	75.31	24.69
Cottonwood	3,682,000	21.48	7.08	26,060	82.35	17.65
Tupelo	2,100,000	12.25	8.10	17,000	100.00	.....
Elm	2,057,000	12.00	8.01	16,472	29.27	70.73
Ash	2,001,000	11.67	10.00	20,000	100.00	.....
White oak	800,000	4.67	12.00	9,600	100.00	.....
Shortleaf pine	661,000	3.86	7.12	4,708	100.00	.....
Longleaf pine	575,000	3.35	12.00	5,800	30.43	69.57
Sycamore	500,000	2.92	12.50	6,250	100.00	.....
Persimmon	250,000	1.46	33.00	8,250	100.00	.....
Hickory	164,000	.96	20.00	3,280	100.00	.....
Hackberry	150,000	.87	10.00	1,500	100.00	.....
Locust	50,000	.29	10.00	500	100.00	.....
Osage orange	50,000	.29	120.00	6,000	.....	100.00
Cypress	25,000	.15	12.00	300	100.00	.....
Red oak	25,000	.15	10.20	255	100.00	.....
Total	17,140,000	100.00	9.70	166,275	79.26	20.74

LUMBER CUT AND MANUFACTURED PRODUCTS.

Table 18, which is based on statistics of the lumber cut contained in the Census Bulletin entitled "Forest Products of the United States, 1909," and reports from Arkansas manufacturers, shows that 59.04 per cent of the lumber cut is further manufactured in the State. Though the lumber cut is for the year 1909, and the figures for the manufactured commodities are a little more than a year later, the comparison is probably as accurate as if the figures for the sawmill output and manufactured products were for exactly the same period, since a great deal of the lumber cut in 1909 was remanufactured in 1910.

TABLE 18.—*Annual lumber cut compared with amount further manufactured by the wood-using industries in Arkansas.*

Kind of wood.	Lumber cut.[1]	Amount further manufactured.	Per cent further manufactured.	Average value at sawmill.[2]	Average cost at factory.[3]
	Feet b. m.	*Feet b. m.*			
Yellow pine	1,313,668,000	952,314,000	72.49	$13.16	$11.31
Oak	358,556,000	97,552,000	27.21	19.18	15.84
Red gum	200,953,000	96,923,000	48.23	12.59	11.46
Cypress	55,012,000	12,030,000	21.87	16.35	14.78
Cottonwood	54,507,000	15,623,000	28.66	18.99	12.51
Hickory	45,133,000	42,934,000	95.13	30.85	19.10
Ash	33,212,000	16,588,000	49.95	24.35	32.78
Maple	18,500,000	114,000	.62	14.08	24.05
Elm	13,056,000	5,081,000	38.92	14.92	12.14
Tupelo	6,084,000	5,222,000	85.83	13.73	8.91
Sycamore	5,406,000	1,602,000	29.63	15.27	11.04
Yellow poplar	4,484,000	30,000	.67	[4]	.....
Basswood	605,000	15,000	2.48	[4]	.....
Walnut	544,000	55,000	10.11	[4]	.....
Cherry	332,000	10,000	3.01	[4]	.....
Birch	138,000	17,000	12.32	[4]	.....
Beech	78,000	10,000	12.82	[4]	.....
All other	1,032,000	[5] 452,000	43.80	[4]	.....
Total	2,111,300,000	1,246,572,000	59.04	.....	.....

[1] Lumber cut from United States census report (Forest Products, 1909).
[2] United States census, 1909.
[3] Reported by manufacturers for 1910 and 1911.
[4] Not separately reported for Arkansas by the United States census.
[5] Includes white pine, mahogany, sugar pine, cedar, osage orange, persimmon, hackberry, and locust, most of which are imported into Arkansas.

A fact to be borne in mind in comparing the total lumber cut with the amount of wood used by the factories is that a considerable quantity of the wood which the factories use never passes through sawmills, but is received in the form of logs or billets. Except for this, practically all wood used by factories comes from sawmills in the form of rough lumber.

A comparison of the values given in the columns headed "Average value at sawmill" and "Average value at factory" shows the remarkable fact that, except for ash and maple, the factory cost of rough lumber is lower than the sawmill value. The figures in each column are averages from hundreds of reports and can not be considered exceptional.

The unusual showing that lumber is cheaper in Arkansas when it reaches the factory than when it leaves the sawmill may be explained in part by the way the values are estimated. The sawmill man's value is presumed to be what he expects to ask for the lumber when he sells it. The factory's cost is what it pays. It frequently happens, particularly with large manufacturers of finished products, that the factory is owner of the sawmill which supplies the lumber. It buys from itself, or one branch of the business charges the other with the lumber at just what it cost at the mill yard. Thus, if yellow pine costs the factory $11.31, but is valued by the sawmill man at $13.16, it means that the owner who transfers the material from one department of his plant to another figures no profit in the transfer; but if

he sells to an outsider he expects to receive the mill-yard value, which in this case is $1.85 more than the factory pays.

A large number of factories making baskets, veneer, excelsior, and the like, consider logs as their raw material, which they get below the cost of sawed lumber at the mill yard. Some of the apparent inconsistencies in value and cost in Table 18 are doubtless due to this.

FUTURE SUPPLY.

The merchantable timber in Arkansas has been estimated at 78,700,000,000 feet board measure,[1] and the yearly cut of all products (lumber, crossties, staves, firewood, etc.) at about 5,000,000,000 feet.[2] The last is much more than the annual growth. It is therefore apparent that the end of abundance is approaching, though absolute exhaustion is not near. The State now sends its forest products all over the country, but in time it will be face to face with the question of supplying its own needs. It should not be expected that a change from abundance to scarcity will come suddenly, or that the landowners will abruptly turn from cutting timber to growing it. The change will be gradual. Yet it has, in fact, already commenced. In some localities there is little timber now where it once was plentiful. These areas of scarcity will enlarge until they cover the State. As the quantity of timber decreases a beginning in practical forestry must be made. Planting trees will perhaps not be the first step. The control of fires is at present more important. In most places timber will grow without artificial planting if protected against fires; but without protection cut-over lands can not produce a new and valuable forest growth.

In Arkansas the pines suffer most from burnings. They do not reproduce from sprouts, as do most of the hardwoods, and when seed trees are cut there can be no reproduction. When cutting is clean, destruction of the pine forests is immediate; but if occasional trees are left, a growth of seedlings will follow, provided fire does not kill them. This, however, is very likely to happen. Up to the present it has nearly always occurred, and the pine lands will become barren unless better protection against fire is provided. A moderate blaze, running through grass or litter where the little trees are getting a start, is usually sufficient to kill nearly all of them.

Longleaf pine is a wood of great value, but if present methods continue the species will be practically at an end in Arkansas when the present stands have been cut, for its reproduction is poor and the seedlings tender. Shortleaf pine is more abundant in the State, but it is being cut ten times as fast as the longleaf, and the same destructive agencies are everywhere attacking the young trees.

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[1] "Summary of the Report of the Commissioner of Corporations on the Lumber Industry, Part 1, Standing Timber," page 20, 1911.

[2] See page 5.

There is little or no Cuban pine in Arkansas, but it may spread into the State from the south. It grows quickly, sheds seeds abundantly, and near the Gulf Coast is restocking some of the cut-over lands; but no certain prediction can be made for it in Arkansas. It is simply a possibility.

Loblolly pine has a fair foothold in the State and is a vigorous species. In North Carolina and Virginia it has restocked large areas of abandoned land and comparatively young stands yield much lumber. It may do as well in Arkansas, but it has not yet done so.

These four—longleaf, shortleaf, loblolly, and Cuban—are the only pines which give promise of bringing on timber in Arkansas to supply future needs, and the present outlook is not encouraging. With protection for seedlings, however, pines will come back in many places where the original forests have been or may be cut.

With hardwoods the prospect for a future supply is a little better. More than 20 well-known species, and twice that many more not so well known, may be drawn upon. Fires which kill all growth above ground may not destroy hardwoods as it does pines, for roots of the former send up sprouts which may become a new forest and in time produce timber. Nevertheless, fire is harmful to any kind of trees and if often repeated will finally destroy all woody growth and change a region to grass or weeds or to bare rock or sands.

As a rule, in future forests will not be permitted to occupy good agricultural lands, but rather swamps, steep slopes, rocky tracts, and poor soils. After half of Arkansas is under farm cultivation (it is not one-fourth in farms now) there will still be immense areas left for timber. Some will lie in tracts too wet for cultivation, even when many swamps have been drained; others will occupy ridges and mountains; others rocky regions, and others poor soils where farming will not pay. There are kinds of trees suited to all these situations, and when the growing of timber becomes as much a business as the raising of fruit, rice, corn, and cotton is now, the tree grower will as carefully choose his kinds as the intelligent farmer selects the sort of crop best suited to his land.

Real forestry has been practiced, often unknowingly, by the farmers who set apart a corner of the farm for a woodlot to grow fuel, posts, poles, fence material, and sawlogs. They usually do no more than keep fires out or protect the woodland from excessive tramping by stock, and let the trees plant their own seeds and grow in their own way. Occasionally a farmer may want a particular wood for some purposes, and he thins the growth of other species to give that one a better chance, or he may plant the kind he wants, as locust, catalpa, or osage orange for posts. In doing so he is putting the principles of forestry into practice.

Large timber owners may follow the farmer's example and do for their holdings what he does for his woodlot. They may protect what they have until ready to cut; they may cut the mature and let the young trees grow; they may give the seedlings and sprouts a chance to develop. Occasionally they may thin the stand by removing poor species to help the desirable ones, and it may be thought profitable to plant where nature can not be relied upon.

If a farmer wishes to grow fence-post timber he does not plant or encourage sycamore, buckeye, basswood, or any other quickly decaying wood, but rather such durable species as locust, mulberry, or catalpa. If he wants lumber he gives preference to quickly growing trees of good form. Uncontrolled, nature is as apt to grow a thorn bush or an elder as a yellow poplar or a white pine. In Arkansas, as elsewhere, the practice of forestry will mean that the inferior woods will disappear and the best will occupy the ground, exactly as the Texas longhorn cattle and the razorback hogs have been replaced by breeds that pay better and can be raised as cheaply.

Arkansas has much swamp land which for a long time to come will be more profitable for growing timber than for anything else. Only certain kinds, however, will grow there. In such situations cottonwood and willow give good account of themselves, and the wood of each is fit for many purposes. Black willow (*Salix nigra*) in Arkansas may reach merchantable size in 20 or 30 years, and more of it will grow on an acre than of almost any other wood. It is not a very high class lumber, but makes good boxes, wagon beds, and commodities of that kind. Cottonwood is in more demand and at better prices. It grows rapidly and is suited to many types of wet lands. Cypress and tupelo are swamp trees and will thrive in situations where few other species can live; but they grow very slowly, and it is questionable whether after the present stands have been exhausted they will figure largely in the supply.

Willow oak (*Quercus phellos*) is a tree with leaves like willow and wood like red oak. It thrives well in some parts of Arkansas, especially in the lower valleys. In favorable situations it increases in size nearly as rapidly as willow. The wood is generally considered of somewhat less attractive grain than red oak, but it often goes to market as such. It is strong, hard, stiff, and fit for many uses. When oak timber is planted for commercial purposes in Arkansas, the willow oak will doubtless be carefully considered because of the vigor of its growth and the desirable form of the trunks, which clear themselves of limbs and make shapely, solid sawlogs.

Doubtless some of the less desirable species of oak in Arkansas, such as blackjack (*Quercus marilandica*), will gradually disappear from the forests because not wanted; but other species may be expected to hold their place through all changes. White oak (*Quercus alba*) is one of these. It constitutes a considerable part of the forest wealth now, and, if proper management is applied, should be

even more important in the future. It does not grow very rapidly, but it assumes a value as soon as it reaches crosstie size, and one which increases for a century or more. The Texan oak (*Quercus texana*), usually designated simply as red oak or spotted oak, also promises to remain as a permanent resource in the State, and the same is true of post oak (*Quercus minor*).

Hickory, ash, and red gum may always be counted on to hold their place. Hickory is very easy to plant, is hardy, and has a fairly rapid growth. Arkansas is included within its natural range, and it will probably be one of the safest trees to plant for commercial purposes, provided due care is exercised in selection of species and soils.

Persimmon also promises to figure in the future timber supply of Arkansas. It provides material for shuttles and shoe lasts, and the market is likely to be permanent and prices reasonably good. Few forest trees are better able to take care of themselves than persimmon. It sprouts vigorously from roots, even after repeated cuttings. It grows rather slowly, but since the sapwood and not the heartwood is most valuable, trees need not be very large to be merchantable. The dark heartwood, however, is valuable for some kinds of inlay.

Osage orange, which is now the highest priced native wood of the United States, thrives well when planted in Arkansas, though its natural range lies southwest in Oklahoma and Texas. Its chief use is for fence posts and wagon felloes. As long as land is farmed fence posts will be needed in large numbers, and nearly every farmer can grow what posts he needs by utilizing rough or waste corners of his land. Osage orange is not the only good tree for this purpose. Locust (*Robinia pseudacacia*) lasts as well and grows as rapidly, but in some localities it is liable to attack by the locust borer.[1] Its natural range barely touches Arkansas, but it grows vigorously when planted. Catalpa is another post timber which does well when planted in the State, and red mulberry is another. A good deal of mulberry grows wild.

There is no lack of good species and suitable soils to supply timber for Arkansas for all the future, if an effective forest policy is inaugurated in the State. Much timber still remains, but not enough to meet for many years a demand like the present. The history of nearly all of the older lumber-producing States has been the same. For a time they supplied themselves and sold to their neighbors, then home supply and home demand became equal, and finally the people were obliged to buy away from home. For some years Arkansas will have a surplus, but the tide will turn. Timber will then be scarce nearly everywhere, and the State or the region which has neglected its woodlands and used them excessively, and wasted unreasonably, will face a crisis in its industrial affairs.

[1] This insect and its control are discussed in Bureau of Entomology Circular 83, U. S. Department of Agriculture.

PART II.—TIMBER RESOURCES OF THE NATIONAL FORESTS IN ARKANSAS.

OZARK AND ARKANSAS NATIONAL FORESTS.

Two National Forests lie in Arkansas, the Ozark and the Arkansas. The first was created by proclamation in 1907 and the other the following year. Each has large quantities and several kinds of mature timber, which the Government offers for sale. This portion of the bulletin deals with the kinds, quantity, and accessibility of the timber on the two Forests, and the regulations under which it is sold and cut, as well as the prospective markets for it.

The Arkansas National Forest lies in Montgomery, Polk, Scott, Yell, Perry, Garland, Sebastian, Logan, Howard, Saline, and Pike Counties. The total area within its borders is about 1,250,000 acres, but 500,000 acres of this are privately owned.

Much of the Forest area is made up of ridges running east and west, giving a north and south exposure. The elevation varies from 600 to 3,000 feet. The region is drained by several rivers; the Ouachita heads in the northwest central portion and runs east, the South Fork of the Fourche traverses the northern part of the Forest, and the Poteau runs in a southwesterly direction across a portion of the northwestern part. These streams and many of their tributaries can be made drivable at little expense. Most of the timber on the Forest is accessible to roads, which are numerous and thread the Forest in all directions. These are generally in good condition. The Forest Service has cooperated with citizens in making some roads, which have added to the Forest's accessibility. About 70 per cent of the timber on the Forest is at present accessible to railroads, and it is probable that nearly all soon will be. The Fort Smith & Gurdon Railroad, which at Gurdon connects with the St. Louis, Iron Mountain & Southern Railroad, serves the south central portion of the Forest. The western part is accessible to the Kansas City Southern Railroad and the Arkansas Western combined. The Rock Island taps the northern part, and a proposed line to cross the region from north to south will open some interior portions. Other proposed railroads will further contribute to the development of the timber resources.

The Ozark National Forest lies in the Boston Mountains of the Ozark Range, in Marion, Baxter, Stone, Cleburne, Van Buren, Conway, Searcy, Newton, Pope, Johnson, Franklin, Washington, and Crawford Counties. The land was surveyed by the Government many

years ago, and the Forest boundaries follow the legal subdivisions. About 70 per cent of the Forest has been covered by the United States Geological Survey. The Forest Service is making additional topographic maps for its own use and for the convenience of prospective purchasers. Fifty-foot contours will be shown, together with streams, roads, and estimates of timber.

The Ozark Forest contains 963,500 acres, all but 33,710 of which are woodland. However, only about half of the land included within the Forest boundaries belongs to the Government, the other half having been alienated by homesteads, mining claims, timber and stone claims, and railroad grants. The timber belonging to the Government is so situated as to be available for large and small lumbering units.

The topography of the Forest is characterized by numerous irregular, low, but well-defined ridges which radiate from the central mass in a generally north and south direction like spider legs. There are numerous high peaks, bluffs, limestone precipices, benches, and cliffs. The valleys are usually narrow, except at their outlets, and the larger ones have been cleared for farms to quite an extent. The ridges are sufficiently wide and flat in places to attract the farmer, and along these also are the best roads. Altitudes vary from 500 to 2,100 feet above sea level.

About 60 per cent of the timber in the Forest is at present accessible to railroads. With the building of a line now projected from St. Louis to Fort Smith, however, all will be accessible. Public highways over which material may be hauled to the railroads now exist, though some would need repairs. Work of that kind is done by the counties.

Five railroads are now within reach of the Forest: The White River branch of the St. Louis, Iron Mountain & Southern, on the east, connecting Carthage, Mo., and Newport, Ark.; the Missouri & North Arkansas, following the Little Red River through the central part of the Forest, joining Joplin, Mo., and Helena, Ark.; the St. Louis, Iron Mountain & Southern, on the south, running between Fort Smith and Little Rock; the Frisco, on the extreme west; and the St. Paul branch of the Frisco, joining Pettigrew and Fayetteville.

The somewhat broken topography of the region makes the construction of tramroads rather expensive. One tramway has been built into the Forest region a short distance from Leslie.

The freight rates per hundredweight on lumber from Leslie, which is a central shipping point for the Forest, are approximately as follows:

To Kansas City, Mo.	$0.14
To St. Louis, Mo.	.14
To Memphis, Tenn.	.12
To Chicago, Ill.	.24
To Little Rock, Ark.	.11

The rates per hundredweight on wagon squares, implement and furniture squares, hubs, spokes, etc., are about 34 per cent higher. Local rates for lumber on all railroads in the State are approximately as follows:

25 miles or under	$0.04½
25 to 50 miles	5
50 to 100 miles	8
100 to 150 miles	10
150 to 200 miles	11

TIMBER IN THE FORESTS.

The Arkansas and Ozark National Forests contain both hardwoods and softwoods. In the Arkansas Forest shortleaf pine predominates, forming 58 per cent of the total stand. The remainder is mixed hardwoods. In the Ozark Forest the order is reversed, and more than half of the stand is hardwoods. The mixture of pine and broad-leaved trees indicates that during past centuries shortleaf pine has been working its way northward and slowly crowding the broad-leaf trees from ground which they once held. If this is true, the process has gone much farther in the Arkansas Forest than in the Ozark, which is farther north. Though the hardwoods on the Ozark are generally less defective, somewhat larger, and more thrifty, there is little difference in the two Forests between trees of the same species, and the following description of individual species applies to both.

WHITE OAK.

White oak (*Quercus alba*) is the most important hardwood of the Arkansas Forest, and its estimated stand of 400,000,000 board feet places it next to shortleaf pine in quantity. In the Ozark Forest white oak, with an estimated stand of 605,925,000 feet, exceeds pine in quantity. It is found in all situations in both Forests, but makes its best growth in deep, moist, well-drained soils of the north slopes and rich flats, where it produces a straight trunk, frequently 3 feet in diameter, but often with a heavy top. Its average height is 75 feet. The wood, which is of very good quality, is heavy, hard, strong, tough, and durable in contact with soil.

There are frequently found in mixture several other of the white oaks, including overcup oak (*Quercus lyrata*), post oak (*Quercus minor*), chinquapin oak (*Quercus acuminata*), bur oak (*Quercus macrocarpa*), and swamp white oak (*Quercus platanoides*). There is very little difference in the woods of these white oaks, and they usually go to market under the single head of "white oak."

RED OR BLACK OAKS.

Under the head "Red or black oaks" are included red or Texan oak (*Quercus texana*), Spanish oak (*Quercus digitata*), and yellow or

black oak (*Quercus velutina*). Of these oaks together there are approximately 130,000,000 board feet in the Arkansas Forest, and 253,000,000 feet in the Ozark Forest.

The red, Texan, and Spanish oaks are confined pretty closely to the rich, moist soils of the north slopes and benches, while the yellow oak (*Quercus velutina*) prefers the drier soils of the ridges. Red oak reaches its largest size on rich soils and may attain a diameter of 3 feet. The wood of the black or yellow oak (*Quercus velutina*) is likely to be brash and defective; that of all the other red oaks mentioned, however, is excellent in quality.

HICKORY.

The total stand of hickory, chiefly shagbark hickory (*Hicoria ovata*), black hickory (*Hicoria glabra*), and mockernut hickory (*Hicoria alba*), in the Arkansas Forest is about 350,000 board feet, and in the Ozark Forest approximately 40,000,000 feet. The shagbark flourishes on the high benches and north slopes, mockernut, usually, on the ridges. Hickory attains its largest size in the Ozark Forest, where it often reaches a diameter of 2 feet. The characteristics of the various species differ little, and all of them are sold under the one head—hickory. The wood is of good quality, flexible, tough, and fine grained, well adapted to the manufacture of vehicle parts, handles, and agricultural implements. Because of its increasing scarcity, the few trees which may be removed in timber sales must be closely utilized.

RED OR SWEET GUM.

Red gum (*Liquidambar styraciflua*) is found in the valleys, lower moist slopes, and benches of north exposures. The stand in the Arkansas Forest is about 3,348,000 feet, but the quantity in the Ozark has not yet been determined. The tree reaches an average height of 100 feet and a diameter of 2 feet.

Up to 15 or 20 years ago red gum had very little commercial value, but now it is being used extensively in the manufacture of lumber and furniture. The wood is close grained, and it can be easily stained. It is liable to serious warping when used green, but no trouble is encountered with the lumber if thoroughly dried.

SHORTLEAF PINE.

A conservative estimate of the available saw stock of shortleaf pine (*Pinus echinata*) in the Arkansas Forest is 750,000,000 board feet, and in the Ozark 108,890,000 feet. On favorable soils on the lower slopes the tree frequently attains a height of 100 feet and a diameter of 3 feet. The wood is heavy and resinous, although less so than most pitch pines. Its quality is good, and most of the lumber is used for interior finish and structural work.

RED CEDAR.

Red cedar (*Juniperus virginiana*) is found scattered throughout the Ozark Forest in small pure groups, generally on limestone ledges and shale outcroppings where no other tree will thrive. The cedar on private holdings has been nearly exhausted by pencil companies and exporters. Many of the smaller trees and much defective material are now being removed for fence posts.

BLACK LOCUST.

Black locust (*Robinia pseudacacia*) is frequently found on north slopes, where it attains a diameter of from 9 to 10 inches in 60 or 70 years, and a height of 60 feet. The locust borer and a punk fungus often unfit the species for its principal use as posts and poles, though a limited number of worm-hole defects are not detrimental, except so far as they may contribute to decay. It can be taken, however, for insulator pins and similar small products. Locust often grows in mixture with other hardwoods, and the exact amount of it on the two forests is not known.

BASSWOOD.

Basswood (*Tilia americana*) trees are occasionally found on deep, moist soils, which produce long, straight stems, free from branches. The total amount of basswood in the two Forests is small. The tree is not lumbered for itself, and only occasionally with other species. The wood is of excellent quality and suitable for excelsior, woodenware, furniture backing, trunks, etc.

SASSAFRAS.

A small quantity of sassafras (*Sassafras sassafras*) is scattered over the hills, some trees reaching a large size. The wood is very durable and therefore suited for shingles, posts, and poles.

SYCAMORE.

Sycamore (*Platanus occidentalis*) frequently grows along streams, where it reaches large size. At present it is not put to much use in the region, but its wood is excellent for furniture, interior finishing, and plug-tobacco boxes.

SUGAR MAPLE.

Sugar or hard maple (*Acer saccharum*) occasionally occurs along streams and on lower north slopes. Although the wood is of good quality, the trees are small. It is useful in the manufacture of furniture.

BLACK WALNUT.

Black walnut (*Juglans nigra*) is scarce in the National Forests of Arkansas. The region, however, is well suited to its growth, and an effort is being made to increase its production by the planting of seed and the protection of seed trees. In consequence no black walnut, except dead and down, is for sale. The manufacturers of organs, gunstocks, and telephone boxes are important users of the wood.

WHITE ASH.

White ash (*Fraxinus americana*) is restricted to the lower elevations, seldom reaching the rich, well drained soils of the lower north slopes and valleys. The quantity compared with that of oak and pine is small, and its cut is little. The wood, however, is of good grade and suitable for farm implements, handles, and oars.

ELM.

Three species of elm are found in small quantities in the National Forests of Arkansas in mixture with other hardwoods; white or water elm (*Ulmus americana*), slippery elm (*Ulmus pubescens*), and winged elm (*Ulmus alata*). White elm attains the largest size, winged elm the smallest. The wood of all three species is similar and of fair quality, being strong, tough, heavy, and hard to split. It can be used for wagons, tool handles, saddle trees, etc.

BLACK CHERRY.

Wild black cherry (*Prunus serotina*) is scattered in small quantities through both Forests, and although small in size and amount, the wood is of good quality. It is valuable for furniture and interior finish.

COTTONWOOD.

Cottonwood (*Populus deltoides*) is found only along the large streams and in small quantities. Some trees attain a large size, sometimes exceeding 100 feet in height and 4 feet in diameter. The wood is light and soft and can be used for wagon-box boards, kitchen furniture, and woodenware. Beech, hackberry, box elder, dogwood, persimmon, black ash, blue ash, green ash, sumac, chinquapin, and river birch are scattered here and there through both Forests, but the quantity of each is small.

STAND OF VARIOUS SPECIES.

Tables 19 and 20 show the approximate stands of various species in both Forests and the percentage of the total stand of each. The stand per acre of all species is about the same for both Forests, running from 2,000 to 14,000 board feet.

TABLE 19.—*Stand of timber in the Arkansas National Forest, and percentage of principal species.*

Species.	Diameter.		Total stand.	Per cent of total stand.
	Average.	Maximum.		
			Board feet.	
Shortleaf pine	18	32	750,000,000	54.98
White oak	17	36	400,000,000	29.32
Red and black oak	16	18	130,000,000	9.53
Hickory	16	18	350,000	.03
Red gum	16	22	3,348,000	.24
Miscellaneous			80,487,000	5.90

Actual area of Forest, 750,000 acres.

TABLE 20.—*Stand of timber in the Ozark National Forest, and percentage of principal species.*

Species.	Total stand.	Per cent of total stand.
	Board feet.	
Shortleaf pine	108,890,000	10.15
White oak	605,925,000	56.51
Red and black oak	252,809,000	23.57
Hickory	40,271,000	3.76
Miscellaneous	63,248,000	5.90
Cordwood	1,174,000	.11

Actual area of Forest, 481,575 acres.

The figures of stand on the Ozark Forest are based on surveys made in its northeastern and extreme western portions, comprising one-seventh of the total area of the Forest. The total approximate amount of timber in the entire Forest was arrived at by multiplying the stand actually cruised by 7. Since the pine belt in the southern portion of the Forest was not touched by the cruise, the estimate for pine is probably too low.

SALE OF TIMBER.

Mature timber on the Ozark and Arkansas National Forests is for sale, wherever it can be fully utilized. A peculiar condition exists in respect to the most valuable hardwood timber, however, which must be taken into account in making sales. This is the fact that much of the valuable hardwoods are at present inaccessible to all but stave operators. The stave operator, as he now conducts his business, is

necessarily wasteful in the woods. He takes only the very best material from a tree, leaving the remainder—often a third or more—to rot on the ground. He has no means of utilizing material that is not almost entirely free from defects. In some cases it might be possible for him to enlarge his equipment so as to manufacture insulator pins and brackets, chair and furniture squares, hubs, crating, clothespins, and the like, thus utilizing what he now leaves; but up to the present, lack of transportation facilities and available markets has hampered him in doing so. From the standpoint of forest conservation, therefore, the sale of timber to stave operators under present conditions is in many cases undesirable. Such sales, it is true, have been made in the past and will be made in the future; but it is the intention to confine these chiefly to overmature white oak, for which there is no other market, and to hold the larger bodies of timber until increased transportation facilities make possible its complete utilization. Wherever an operator is able to utilize all the material he cuts, sales will, of course, be made. In addition, small operators who wish to cut cordwood, posts, and other material to supply local demand will at all times be able to purchase what they need.

With pine the case is different. As a rule, the lumberman removes and manufactures all usable material. In the Ozark Forest the pine is so scattered that extensive operations in it alone would be impracticable, but in the Arkansas Forest it occurs in large bodies.

When application is received for the purchase of a considerable amount of National Forest timber, the stand selected is examined by a Forest Officer, who reports on the character, species, and amount of timber found, and the amount that may be cut in accordance with the principles of forestry. He also recommends a stumpage rate based upon the probable cost of operation and selling price of the lumber, and furnishes a map showing the topographical features of the area, patented lands, and the boundaries of the proposed sale. A formal application, embodying the features of the sale, is then presented for the signature of the applicant, who deposits $50 to cover the cost of advertising for a period of 30 days. At the expiration of this period the sale is awarded to the successful bidder by means of a formal contract. To insure compliance with its terms a reasonable bond is required of the purchaser. As soon as the first advance payment is made the timber to be removed is marked by a Forest officer, and the purchaser begins operations. Throughout the progress of every large sale the timber cut is scaled, and the scale checked, by trained men employed by the Government especially for the purpose. Upon the basis of their reports the operator's advance payments are made.

Special provision has been made for the quick handling of small sales. Sales of timber not exceeding $50 in value may be made by

Forest officers designated by the supervisor, and the whole transaction need occupy only a short time. Application is made by the prospective purchaser to the officer in charge of that portion of the Forest from which it is wished to secure timber. This officer selects the area from which timber may be cut, marks the trees to be removed, and permits cutting to begin as soon as he is assured that payment for the timber has been forwarded to the designated United States depository. Sales of timber between $50 and $100 in value are made in the same simple manner, except that the supervisor only may approve the purchase.

From a business standpoint, large operations in National Forest timber offer certain distinct advantages over those in private timberlands acquired by purchase. In cutting National Forest timber there are no taxes to be borne, nor is there required a large initial investment, on which interest must be earned from the beginning. Instead, the purchaser makes payments periodically in advance of cutting. On a privately owned area the land, of course, remains as an asset after the timber is cut, but its value would seldom if ever go far to counterbalance the interest and taxes eliminated in National Forest sales. Moreover, in such sales the fire risk is carried by the Government.

On the other side of the ledger are certain items of expenditure peculiar to National Forest operations. These are the piling of brush after cutting, the cost of which varies from 15 cents to 40 cents per 1,000 board feet, and the additional cost of logging brought about by leaving seed trees and protecting reproduction and young growth against injury in logging on the lumbered area. The total of these items does not usually add more than from 50 cents to 75 cents per thousand to the cost of logging. In fixing stumpage rates these additional operating expenses are determined as accurately as possible and the rate charged is lowered accordingly. In fact, care is exercised to see that the stumpage rate bears such a relation to the total cost of production as to insure a fair margin of profit on the operation.

To insure that a purchaser of National Forest timber whose contract covers a number of years shall receive a fair proportion of any increase in lumber values during the period of the sale, it is proposed to readjust stumpage rates at five-year intervals throughout the life of a sale contract, increasing the original stumpage rate each time by 75 per cent of the difference between the f. o. b. mill selling price for each species when the sale was initiated and that on the date the readjustment is made. This guarantees to the United States a fair stumpage rate throughout the entire life of the transaction and to the purchaser a fair profit.

COST OF MANUFACTURE AND STUMPAGE.

The following figures are, in general, a fair estimate upon which to base cost of manufacture of hardwood in the Ozark region where wagon haul to transportation points does not exceed from 8 to 10 miles. Greater hauling distances would increase the cost accordingly.

	Per M.
Stumpage price	$3.00
Felling and brush disposal	1.25
Haul to mill (1 mile)	3.75
Sawing at mill	3.00
Lumber hauled (8 miles)	8.00
Total	19.00

In this estimate the stumpage price has been placed at $3, which is the average for species such as red oak, white oak, hickory, and pine, while less desirable ones, as red and black gum, and sometimes black oak, may be sold as low as $1.50. The stumpage price of the best species depends, of course, upon the timber's accessibility, and may be increased in proportion to its proximity to the railroad. The cutting limit in the Ozark for the year 1911–12 has been set at 20,000,000 board feet, for all species, and on the Arkansas at 15,000,000 board feet. Maps of the Ozark Forest can be secured from the forest supervisor, Harrison, Ark., and of the Arkansas Forest, from the forest supervisor, Hot Springs, Ark.

APPENDIX.

GRADES AND SPECIFICATIONS OF ROUGH STOCK AND SQUARES EMPLOYED IN MAKING SPECIAL HARDWOOD PRODUCTS FOR FACTORY USE.

The following list gives a general idea of the grades and dimensions required for different hardwood products. While, as explained in the footnote on page 6, the demand for quality and size is not uniform even in the same industry, the list may yet be of some value in determining the amount of merchantable material in a defective log, where short cuttings may often be made between large knots, rot pockets, and the like.

Class of material.	Dimensions, etc.
Furniture lumber	In plank or board No. 1 common or better used for cuttings.
Ties	Hewed, split, or sawed dimensions vary from 6″ x 6″ to 7″ x 9″ up to 16′ in length for switches. Reasonably sound, coarse material utilized.
Cooperage (tight)	For staves: No defects, cut from trees not less than 16″ in diameter. Bolts to be approximately 36″ long. For heading: Same as for staves, only bolts may be cut 20″ to 22″ in length.
Cooperage (slack)	Rough stock, inferior species admitting of considerable defects yet serviceable for barrels not to contain liquids. Dimension specifications approximately the same as for tight stock.
Wagon axles	Squares 2¾″ x 3¾″ to 6″ x 7″ and 6′ long. Inspection as per grading rules.
Wagon bolsters	Squares 3″ x 4″ to 4″ x 6″ and in lengths 4′ 1″ to 4′ 6″. Inspection as per grading rules.
Wagon reaches	Squares 2″ x 4″ to 2½″ x 5″ and in lengths 8′ 10″ to 14′. Inspection as per grading rules.
Wagon poles	Squares 2½″ x 4″ tops, to 4″ x 4″ butts and 12′ long to 3¼″ x 3¼″ tops, to 3¼″ x 5″ butts and 12′ long. Inspection as per grading rules.
Wagon eveners	Squares 2″ x 4″ to 2½″ x 5″ and in length 4′ 2″ x 4′ 6″.
Singletrees	Squares for turning to be 2½″ x 3″ and 36″ long.
Neck yokes	Squares for turning to be 4″ x 4″ and 44″ to 48″ long.
Felloes (wagon)	Squares for sawing may be made from short, clear cuttings 10″ to 14″ wide and from 24″ to 30″ long.
Hub stock	In the round for turning. Blocks to be 9½″ to 12″ in diameter inside of bark and 12″ to 15½″ long.
Spokes	Squares for turning to be approximately 2″ x 2½″ and 30″ in length.
Boxboards	9″ to 17″ in width and 12′ to 16′ in length.
Implement stock	Factory stock, boards, and plank for cuttings, to grade No. 1 common and better.
Handle stock	Split or in round for factory. Bolts to be cut 40″ long. Usually corded.
Locomotive and car timbers	Dimension stock usually cut to order as per uses.
Excelsior	Cut as cordwood; seasoned for shaving. 38″ cord.
Pencil stock	Reasonably clear material. Corded or cut into deals for export.
Poles, posts, and piling	Cut to order as required.

SUMMARY OF USES OF WOOD BY ARKANSAS MANUFACTURERS.

ASH.

Baseball bats.
Butter tubs.
Carriages
Crates (butter).
Farm implements.
Furniture.
Handles (fork, hoe, rake, shovel).
Interior finish.
Oars.
Plows.
Tables.
Tools.
Trucks.
Tubs.
Wagons.
Wheelbarrows.

BASSWOOD.

Box boards.
Excelsior.
Wagon beds.

BEECH.

Broom handles.
Mop handles.

BIRCH.

Ceiling.
Flooring.
Interior finish.
Siding.

CEDAR.

Cabinets.
Caskets.
Chests.
Coffins.

CHERRY.

Base blocks.
Baseboards.
Cabinets.
Casing.
Chests.
China closets.
Fixtures.

COTTONWOOD.

Boxes.
Box shooks.
Buggies.
Cases (egg).
Coops.
Excelsior.
Plow parts.
Trunks.
Wagon beds.

CYPRESS.

Boats.
Boxes.
Caskets.
Ceiling.
Coffins.
Crating.
Doors.
Flooring.
Frames.
Interior finish.
Pails.
Sash.
Screens.
Siding.
Silos.
Store fronts.
Tanks.
Tubs.
Vehicle stock.

ELM.

Bands.
Bed slats.
Bending bows.
Boxes.
Cases (egg).
Conveyers.
Coops.
Crates.
Hubs.
Plugs.
Pulleys.
Trunk slats.

HACKBERRY.

Ceiling.
Flooring.
Interior finish.
Siding.

HICKORY.

Automobile spokes.
Ax handles.
Axles.
Buggy poles.
Buggy spokes.
Crossbars (vehicle).
Doubletrees.
Handles (tool).
Neck yokes.
Plows.
Poles (vehicle).
Rims (vehicle).
Shafts (vehicle).
Singletrees.
Spokes.
Sucker rods.
Vehicles.
Wagons.
Wheels.

LOCUST.

Farm implements.
Furniture.
Pins.
Wagon stock.

LONGLEAF PINE.

Blinds.
Boxes.
Casing.
Caskets.
Ceiling.
Coffins.
Doors.
Flooring.
Interior finish.
Molding.
Sash.
Siding.

MAHOGANY.

Cabinets.
Chests.
Fixtures.

MAPLE.

Chairs.
Handles (brush, broom, pail).

OSAGE ORANGE.

Felloes.
Pins.
Spokes.
Wagon stock.

PERSIMMON.

Bobbins.
Golf sticks.
Lasts.
Shuttles.

RED GUM.

Blinds.
Boxes.
Box shooks.
Broom handles.
Cabinets.
Cases (egg).
Caskets.
Ceiling.
Chairs.
Chair seats.
Coffins.
Coops.
Couches.
Crates.
Doors.
Fixtures.
Flooring.

RED GUM—continued.

Furniture.
Interior finish.
Panels.
Plugs.
Sash.
Siding.
Sheeting.
Shelves.
Vehicle stock.
Wagon stock.

RED OAK.

Bridge material.
Buckets.
Cars (railroad).
Chairs.
Chair legs and posts.
Harrows.
Kitchen cabinets.
Plows.
Reaches.
Stretchers.
Tables.
Wagon bows.
Wagon stock.

SHORTLEAF PINE.

Balusters.
Banisters.
Beehives.
Boxes.
Box shooks.
Cars.
Casing.
Caskets.
Ceiling.
Coffins.
Columns.
Couches.
Crates.
Doors (grain).
Doors (screen).
Door panels.
Door rails.
Door stiles.
Excelsior.
Fixtures.
Flooring.
Framing.
Interior finish.
Molding.
Newels.
Railings.
Sheeting.
Sills.
Stands.
Store fronts.
Store furniture.
Tables.
Tent poles.
Tramways.

SUGAR PINE.

Blinds.
Doors.
Interior finish.
Molding.
Sash.
Screens.

SYCAMORE.

Boxes.
Box shooks.
Cases (egg).
Farm implements.
Furniture.
Trunk slats.
Wagon stock.

TUPELO.

Baskets.
Boxes.
Ceiling.
Crates.
Flooring.
Interior finish.
Pails (lard and candy).
Porch columns.
Tubs.

WALNUT.

Cabinets.
Caskets.
Coffins.
Furniture.
Switchboards.

WHITE OAK.

Automobile spokes.
Axles (wagon).
Bolsters (wagon).
Bridge material.
Butter tubs.
Cabinets.
Cars (railroad).
Caskets.
Casket cases (outer).
Chairs.
Coffins.
Couches.
Cross arms.
Church pews.
Cupboards.
Davenports.
Doors.
Door screens.
Dressers.
Extension tables.

WHITE OAK—continued.

Felloes (wagon).
Fixtures (store and office).
Frames (buggy bodies, wagon beds).
Furniture.
Gears (vehicle).
Handles (hammer, pick, sledge, shovel, spade).
Hounds (wagon).
Hubs (vehicle).
Interior finish.
Kitchen cabinets.
Kitchen safes.
Locomotive (woodwork).
Mantels.
Neck yokes.
Panels.
Parquetry flooring.
Plow beams.
Plow handles.
Plow rounds.
Poles (buggy).
Pulleys.
Reaches (buggy).
Rims.
Safes (kitchen).
Sand boards (wagon).
Show cases.
Singletrees.
Spokes.
Stands.
Tables.
Tongues (wagon).
Trucks.
Vehicles.
Washstands.
Wheelbarrows.
Window screens.

WHITE PINE.

Beds.
Cabinets.
Dressers.
Stands.
Tables.

YELLOW POPLAR.

Beehives.
Blinds.
Casing.
Ceiling.
Doors.
Finish (interior trim).
Fixtures (store and office).

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